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ABSTRACT:

Determinants of U.S.- Canada Intra-industry trade in industry groups: a) Food and live products, b) Manufacturing products, and c) Machinery and transportation products are investigated. The analysis uses the OECD data for 1997 U.S.-Canada bilateral trade flows combined with the U.S. industry characteristics data from the U.S. Economic Census. Levels of intra-industry trade, measured by the Grubel Lloyd Index, were regressed on a number of industry characteristics using OLS techniques. Empirical results show that selected measures of product differentiation, economies of scale, and oligopolistic behavior are important determinants of U.S.-Canada bilateral trade in the selected industries. There are however, differences among different industry groups.

1. Introduction

In February 1989, the U.S.-Canada Free Trade Agreement (FTA) went into effect, with the goal of eliminating all tariffs on U.S. and Canadian goods and substantially reducing other barriers to trade over a 10-year period. On January 1, 1994, United States, Canada, and Mexico signed the North America Free Trade Area (NAFTA) agreement, which created a free trade area with more than 360 million people and a combined gross domestic product of roughly $6.5 trillion U.S. dollars[3].

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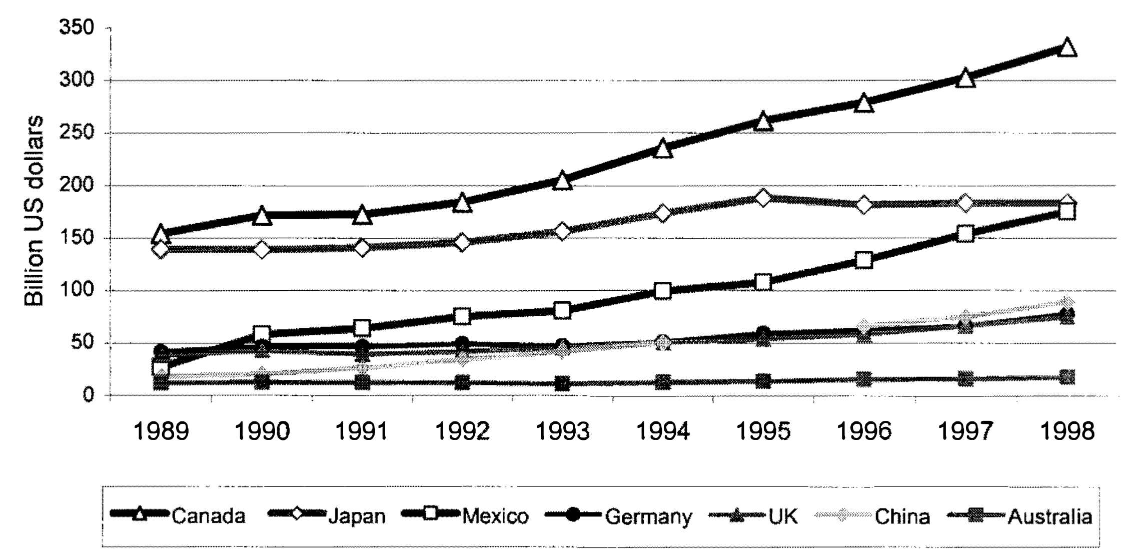
[3] Unless otherwise noted, all data reported in this thesis are OECD data, ITCS (International Trade by Commodity Statistics), SITC/CTCI Revision 3, 1999, 1989-1998.

During the period of 1989 to 1998, bilateral trade between the United States and Canada increased 109% from 154 billion dollars to 322.5 billion dollars whereas U.S. trade with other OECD countries increased at a much lower pace (figure 1). Because of these trade agreements, the United States and Canada enjoy the world's largest bilateral trading relationship; each year these two countries exchange more goods and services than any other two countries in the world. In 1998, U.S. trade with Canada accounted for 16% of total U.S. trade.

Figure 1. US Trade with Major Trading Partners (1989-98)



As in the case of other free trade areas, trade growth between the United States and Canada is expected to grow and be dominated by intra-industry trade (IIT), or simultaneous import and export of products within the same industry. The objective of this paper is to analyze the determinants of U.S.-Canada IIT for a selected set of industries in three different product groups.

2. Literature Review

Traditional trade theory predicts that the removal of trade barriers between countries will cause a country to shift resources from import-competing industries to export industries where the country has a comparative advantage. Resource relocation based on comparative advantage will result in increased one-way trade flow, which is referred to as inter-industry trade.

Frankle (1943) observed a correspondence between the import and export of products within the same commodity group and a country's level of international trade. Verdoon (1960) reported that the specialization accompanied by the increased intra-block trade of the Benelux Union was within rather than between the different product categories. Michaely (1962) noted that the compositions of commodities traded among high-level income countries showed considerable similarity while the opposite held true for less developed countries. Balassa (1963) also reported that much of the trade increase in manufacturing products among EEC countries occurred within rather than between commodity groups. All these studies indicated that with the reduced barriers among member countries, integration took place in the form of increased specialization within industries.

This empirical observation of intra-industry specialization is difficult to explain with classical trade theory. In recent years, a substantial body of literature has emerged that attempts to explain increased intra-industry trade (IIT) when international trade is liberalized. Gray (1973), Toh (1983), and Galvelin and Lundberg (1983) have explained this increased IIT phenomenon by incorporating imperfect competition, economies of scale, and product differentiation into international trade models. A number of researchers such as Galvelin and Lundberg (1983), Loertsher and Wolter (1980), Pagoulatos and Sorensen (1975) empirically tested theoretical hypotheses on these new international trade models and investigated the determinants of IIT between countries for selected industries. Finger and DeRosa (1979) estimated trade overlaps of 14 major industrialized countries for the two periods, 1961 to 1963 and 1974 to 1976, and found an upward trend of IIT, particularly in manufactured products.

Grubel and Lloyd (1971) proposed and calculated an IIT index for 163 products at the 3-digit SITC level for 10 industrialized countries. They found that the level of IIT was "significant" in every industry. The index they proposed is the most commonly used empirical measure of IIT and is referred to as the GL index:

$$(1) \qquad B_i = 1 - \frac{|X_i - M_i|}{(X_i + M_i)},$$

Where B_i is the Grubel and Lloyd index value, unadjusted for trade imbalances, and X_i and M_i denote export and import values for industry i. Grubel and Lloyd noted that in the case of total trade imbalance, the GL index would be biased downward. In order to adjust the trade imbalance, Grubel and Lloyd proposed the trade balance-adjusted GL index:

$$(2) \qquad B_{ijk} = 1 - \frac{\left| \frac{X_{ijk}}{X_{jk}} - \frac{M_{ijk}}{M_{jk}} \right|}{\frac{X_{ijk}}{X_{jk}} + \frac{M_{ijk}}{M_{jk}}},$$

Where:

B_{ijk}	=	The GL index for trade between countries j and k, adjusted for total trade imbalance, for industry i.
X_{ijk}	=	Exports of industry i from country j to country k.
M_{ijk}	=	Imports of industry i into country j from country k.
X_{jk}	=	Total exports of all products from country j to country k.
M_{jk}	=	Total imports of all products into country j from country k.

If an industry's exports from a country equal the industry's imports into the country, the GL index attains a maximum value of 1, indicating a case of an extreme intra-industry trade (two-way trade). On the other hand, if the industry has only exports from the country or only imports into the country, the GL index attains a minimum value of zero, indicating a case of an extreme inter-industry trade (one-way trade). In most cases, however, the calculated GL index values are between these two extremes.

An empirical investigation is conducted to discover if the level of U.S.-Canada IIT in the selected industries is influenced by industry characteristics such as the extent of product differentiation, the presence of economies of scale, and the degree of international oligopolistic rivalry. Specifically, the following three hypotheses are made concerning the determinants of the U.S.- Canada IIT for the selected industries: 1) The level of IIT is expected to be higher in industries with higher degrees of product differentiation; 2) The level of IIT is expected to be higher in industries where the potential gains from scale economy are high; 3) The level of IIT is expected to be higher in industries exhibiting international oligopolistic behavior.

3. Data and Methodology

The main objective of this paper is to investigate the determinants of U.S.-Canada IIT for selected industries in three product and industry categories: 1) Food and live animals (including beverage and tobacco), 2) Manufacturing products, and 3) Machinery and transportation products. The investigation needed two types of data, trade flow data and industry characteristics data.

Bilateral trade flow data for 1997 were obtained from the Organization for Economic Cooperation and Development (OECD). The OECD data is based on Standard Industrial Trade Classification, SITC (Revision 3, 1999). The industry characteristics data, however, were obtained from the U. S. Economic Census and are based on the North American Industrial Classification System (NAICS). Since the two classification systems are different, the first challenge was to match the SITC product classification with the NAICS industry classification. After a careful review, 31 products in SITC classification at the 4-digit level were identified which matched closely with 31 industries in the NAICS classification (Table 1). Accordingly, these 31 industries were included in the empirical analysis.

The levels of U.S.-Canada IIT were measured by the GL Index adjusted for trade imbalance using equation 2 (IITINDEX). The computed IITINDEX series showed varying degrees of IIT among different industries. For example, industries such as electrical apparatus for line telephony or telegram (SITC 7641) showed a higher incidence of IIT. On the other hand, industries such as mixes and doughs for the preparation of bakers' ware (SITC 0485), nitrogen mineral and fertilizer (SITC 5621), and phosphatic mineral and fertilizer (SITC 5622) showed only one-way trade.

Data for basic industry characteristics, such as value added, total value of shipment, number of employees, firm concentration ratios, etc., were collected from the U.S. Economic Census. Empirical work discussed in the literature review suggested that the level of IIT between U.S. and Canada is higher in industries with: 1) higher product differentiation, 2) greater potential for gain from scale economy, and 3) more intensive oligopolistic rivalry behavior. Based on the literature review and the availability of data, a number of measures of industry characteristics were developed which can be potentially helpful in empirical testing of these hypotheses. These measures (variables) and their relation to the specific hypotheses are summarized in Table 2. A brief discussion of these measures in relation to the specific hypotheses follows.

The industries with highly differentiated products are characterized by relatively high advertising cost. The industries with high value added in relation to total value of shipment usually involve a more complicated production process, indicating a higher level of product differentiation. The advertisement expenses per dollar of shipment (ADVERT) and the value added per dollar of shipment (VALADD) are included in the analysis to capture the impact of product differentiation. These two variables are expected to have a positive association with the IIT.

The industries with highly differentiated products also tend to be more capital intensive. Accordingly, a number of studies have used capital intensity as a proxy for product differentiation. On the other hand, Galvelin and Lundberg (1983) provided evidence that high capital intensity could be associated with homogeneous bulk products and therefore would be negatively associated with the IIT. None of the 31 products included in this study are homogenous bulk product.

The U.S. Department of Commerce reports the data on total capital, by industry, at book value. Using this data for calculation of the capital intensity can introduce errors due to inherent discrepancies in the book value and the realistic value of capital in an industry at any point in time. The data on total labor cost (compensation) is free from such discrepancies. As the labor and capital intensities are inversely related, labor intensity (CMLA) can be used as proxy to ascertain the influence of capital intensity on the IIT. The labor intensity will be negatively associated with the level of IIT in case of differentiated products.

In many IIT studies, variables like average size of plant (in terms of production or employment) and the share of the labor force employed in large size plants (e.g. more than 500 employees) have been used as proxies for economies of scale with varying degree of success. The value added per establishment has also been a proxy for economies of scale in production in some studies. In this study, the economies of scale are measured in terms of the average cost of production for the top 20 percent of firms relative to the average for the industry. Accordingly, a dichotomous shift variable (S20) is included in the analysis which takes a value of 1 when the average cost for top 20 percent firms is lower than the average for the industry and is expected to have a positive association with the level of IIT.

International oligopolistic rivalry is another important determinant of the level of IIT. A number of empirical studies have used world market share[4] of U.S. exports in each industry as a proxy for the international oligopolistic rivalry. U.S. industries with higher export world market share are expected to have high entry barriers to foreign companies and, therefore, to have lower degrees of IIT in these industries. Accordingly, the world export market share (WEMS) for U.S. industries is included in the analysis and is expected to be negatively associated with the level of IIT.

Also included in the analysis are two industry group shift variables, MG and AG to identify manufacturing industries and agricultural related products, respectively.

Ordinary Least Square (OLS) regression analysis was selected as the statistical procedure. The general form of linear regression equation is as follows.

$$(3) \qquad Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_i X_i + \ldots + \mu$$

Where Y is the dependant variable; β_i and X_i are the parameters and independent variables, respectively; and μ is the error term, $\mu \sim (0, \sigma^2)$. The analysis assumes the usual assumptions underlying the OLS analysis.

[4] The U.S. International Trade Commission defines the world export market share as the value of U.S. exports in industry i divided by the value of the world exports in the industry. Further, the commission defines the world exports as the sum of exports from the United States, the United Kingdom, Sweden, Germany, the Netherlands, Belgium, Italy, France, and Japan (USITC, 2001).

4 Empirical Results

For exploratory purposes, the IITINDEX initially was regressed over ADVERT, VALADD, CMLA, S20, WEMS, AG, and MG. The initial model did very poorly (Table 3). The only significant variable in this model, other than the intercept, was CMLA. The regression diagnostics did not reveal any serious problem. However, a further investigation showed that there are significant differences among the three industry groups and that the dummy shift variables, AG and MG, were not picking up the differences between these industry groups. Experimenting with interaction terms showed that ADVERT was only significant in the manufacturing sector, and VALADD and S20 were only significant in agriculture related industries. Accordingly, in the final model, ADVERT, VALADD, and S20 were replaced by the interaction terms, ADVER.MG, VALADD.AG, and S20.AG. The final model regression estimates are reported in Table 4. Comparison of the regression estimates for these two models (Tables 3 and 4) shows that the final model is clearly a great improvement over the initial model. The rest of the discussion is focused on the regression estimates for the final model.

The final model has a good explanatory power (R-square 0.425, adjusted R-square 0.309) relative to other IIT empirical studies[5]. Given that this model is a cross-sectional estimate, this equation seems to provide a reasonable fit to the data. All three-product differentiation variables are statistically significant. The advertisement variable (ADVERT.MG), which is a measure of the advertisement expenses per dollar worth of shipment in the manufacturing sector, is statistically significant at the 5% level with the expected positive sign. This is in line with the IIT theoretical foundation that most manufacturing products are highly brand differentiated with a

[5] In most IIT empirical studies, the explanation powers (R-square) are not impressively high. For example, the R-square in the Loertscher and Wolter (1980) models were 0.072 and 0.070; in Pagoulatos and Sorensen (1975) models were 0.360 and 0.400, in Toh (1983) models ranged from 0.256 to 0.331.

high degree of horizontal product differentiation. Accordingly, advertisement expenses are more closely associated with the level of product differentiation in manufacturing industries rather than other sectors and the advertisement expense is an appropriate indicator for the level of product differentiation in the manufacturing sector. However, in most previously reported studies, this variable was not significant, as these studies dealt with combined export markets for many countries. In the case of U.S. Canada trade, the effect of advertisement seems to flow across national borders as both countries share the same language and have similar cultural and social structures.

The value added variable VALADD was only statistically significant with a puzzling negative sign in the agricultural sector, which contradicts the hypothesis that higher value added is expected to be associated with higher levels of product differentiation and higher levels of IIT. Further examination shows that the value added in the agricultural industry, in fact, measures scale economies in production. A higher level of value added in an agricultural industry implies the larger production scale in that industry, which results in a comparative advantage for that industry. According to international trade theory, industries with comparative advantage will engage in one-way trade instead of two-way trade (IIT). Accordingly, the negative relationship between the value added and IIT in agricultural industries is not surprising.

The variable CMLA tests the degree of product differentiation, which is based on the premise that industries with higher labor intensity should have lower capital intensity and lower product differentiation. Indeed, this variable shows the expected negative sign and is statistically significant at the 5% level. This result confirms the hypothesis that industries with lower labor intensity (higher capital intensity) in the production process should have a higher level of product differentiation and higher intra-industry trade.

The scale economy variable S20 is only statistically significant at the 5% level with the unexpected negative sign in the agricultural sector. This indicates that there is a lower level of IIT in agricultural industries with larger economies of scale. This result is consistent with the parameter estimate for VALADD.AG and the theory of comparative advantage. In other words, agricultural industries, with larger economies of scale, reflect comparative advantage in the production process. Consequently, agricultural industries with scale economies, engage in one-way trade.

To test the effect of oligopolistic behavior on the level of IIT, WEMS has the expected negative sign and is statistically significant at the 5% level. This result confirms the hypothesis that the higher the market share of U.S. exports, the greater is the competitive advantage of U.S. firms over foreign companies; therefore, it becomes more difficult for foreign competitors to penetrate the U.S. market. Accordingly, industries with higher market share of U.S. exports tend to have lower level of IIT.

5. Summary and Conclusions

Following the North America Free Trade agreement, U.S.-Canada bilateral trade has increased at a much faster rate than U.S. trade with other trading partners. Previous studies have shown that intra-industry trade or simultaneous import and export of products within the same industry has been a major source of growth in the U.S.-Canada trade.

Determinants of U.S.-Canada IIT trade in three industry groups, 1) Food and live animals products including beverages and tobacco, 2) Manufactured products, and 3) Machinery and transportation products, are investigated. The analysis uses the OECD data for 1997 U.S.-Canada bilateral trade flows combined with the U.S. industry characteristic data from the U.S. Economic Census.

The first challenge for this research was to find matching industries in the two data sets. After a careful review, 31 products in the SITC classification at the 4-digit level (in OECD data) were identified that matched closely with 31 industries in the NAICS classification (in U.S. Economic Census data).

Levels of IIT trade, measured by the GL Index, were regressed on a number of industry characteristics using the OLS technique. Empirical results show that selected measures of product differentiation, economies of scale, and oligopolistic behavior are important determinants of U.S.-Canada bilateral trade in the selected industries. There are, however, differences among different industry groups.

Three measures, namely, the advertisement expenses per dollar worth of shipment, the value added per dollar worth of shipment, and labor compensation per dollar worth of value added, were used as proxies for product differentiation. The advertisement expense variable is positively related to the level of IIT in manufacturing related industries. This is in line with the IIT theory that manufacturing products, with higher brand differentiation, are positively correlated with high advertisement cost, noncompetitive market structure, and higher IIT. The value added variable was significant for only agriculture related industries with a puzzling negative relationship with the IIT levels. It seems that the value added variable in agriculture related industries is a measure of larger production scales and therefore a proxy for a comparative advantage. Accordingly, the negative association of labor intensity with IIT (a positive relationship between capital intensity and IIT levels) for agriculture related industries should not be surprising.

The presence of economies of scale (a lower average unit cost for the largest 20 percent of all firms in an industry) is negatively associated with the IIT levels only in agriculture related industries. This is consistent with the agricultural trade being determined by comparative advantage rather than non-competitive market structure. Finally, as expected, an increase in world market share of U.S. exports in an industry is associated with decreased level of IIT in that industry.

An important insight coming from the empirical evidence presented by this study is that economic forces discussed in both classical and new trade theory affect U.S.-Canada trade patterns. The paper also makes a contribution by proposing new explanatory variables to test existing IIT hypotheses.

References:

Balassa, B. "European Integration: Problems and Issues." *The Amer. Econ. Rev.*, Papers and Proceedings, 53(1963):175-184.

Finger, J .M. and Dean A. DeRosa, "Trade Overlap, Comparative Advantage and Protection." In *On the Economics of Intra-Industry Trade: Symposium, 1978,* ed., Herbert Giersch, Tubingen, (1979):213-240.

Frankle, H. "Industrialization of Agricultural Countries and the Possibilities of a New International Division of Labor." *Econ. J.*, 53(1943):188-201.

Galvelin, L. and Lundberg, L. "Determinants of Intra-Industry Trade: Testing Some Hypotheses on Swedish Trade Data." In *Intra-Industry Trade: Empirical and Methodological Aspects*, ed. P. K.M. Tharkan, North-Holland, Amsterdam, 1983.

Gray, H. P. (1973) "Two-Way International Trade in Manufactures: A Theoretical Underpinning." *Weltwirtschaftliches Archiv.,* Bd. 109, (1973):19sqq.

Grubel, H. G. and P. J. Lloyd "The Empirical Measurement of Intra-Industry Trade." *The Economic Record,* 47(1971):494-517.

Loertscher, R. and Wolter, F. "Determinants of Intra-Industry Trade: Among Countries and Across Industries." *Weltwirtschaftliches Archiv.,* 116(1980):280-293.

Michaely, M. Concentration in International Trade. Amsterdam: North-Holland Publishing Company, 1962.

OECD "International Trade by Commodity Statistics, SITC/CTCI Revision 3." Paris, 1999.

Pagoulatos, E. and Sorensen, R. "Two-Way International Trade: An Econometric Analysis." *Weltwirtschaftliches Archiv.,* 111(1975):454-465.

Toh, K. "A Cross-Section Analysis of Intra-Industry Trade in U. S. Manufacturing Industries." *Weltwirtschaftliches Archiv.,* 110(1983):281-300.

U.S. Census Bureau "1997 Economic Census Economic Census Data, Manufacturing-Industry Series (EC97M Series), http://www.census.gov/prod/www/abs/97ecmani.

USITC "Year in Trade 2001: Operation of the Trade Agreement Program." U. S. International Trade Commission, Publication 3510(May 2001). http://www.usitc.gov/webinfcn.html.

Verdoon, P. J. "The Intra-Industry Trade of Benelux." In *Economic Consequences of the Size of Nations*, Proceedings of a Conference held by the International Economic Association. ed. E.A.G. Robinson, pp.291-207. London: Macmillan-Co. Ltd., 1960.

Table 1. Matching NAIC Industries with Four Digit SITC Industries.

No.	NAICS	NAICS Definition	SITC	SITC Definition
		Food, Live Animals, Beverage, & Tobacco		
1	3112A	Flour milling	0461	Flour of wheat or of meslin
2	3112C	Malt manufacturing	0482	Malt, whether or not roasted
3	3112H	Breakfast cereal manufacturing	0481	Cereal grains, worked or prepared, n.e.s.
4	3116D	Poultry manufacturing	0174	Meat, offal of poultry, prepared or preserved, n.e.s.
5	3118E	Flour mixes & dough manufacturing from purchased flour	0485	Mixes & dough for the preparation of bakers' ware
6	3118F	Dry pasta manufacturing	0483	Macaroni, spaghettis, and similar products
7	3122B	Cigarette manufacturing	1222	Cigarettes containing tobacco
8	3122C	Other tobacco product manufacturing	1223	Other manufactured tobacco; extracts & essences
		Manufacturing Goods		
9	3221C	Newsprint mills	6411	Newsprint in rolls or sheets
10	3272C	Glass container manufacturing	6651	Containers, glass, for conveyance, packing of goods
11	3272D	Glass product manufacturing made of purchased glass	6652	Glassware for domestic use (excluding 6511,66592, 66593)
12	3314B	Primary smelting of nonferrous (except copper & aluminum)	6821	Copper, refined or not; anodes; copper aluminum unwrought
13	3314D	Copper wire (except mechanical)	6824	Copper wire
14	3315D	Aluminum die-casting foundries	6842	Aluminum & Aluminum & aluminum alloys, worked??
15	3379A	Mattress manufacturing	8212	Mattress supports; articles of bedding or similar
16	3391D	Dental equipment and supplies manufacturing	8721	Dental instruments & appliances, n.e.s.
17	3399A	Jewelry (except costume manufacturing)	8973	Jewelry of gold, silver, platinum ,& similar wares
18	3399D	Costume jewelry and novelty manufacturing	8972	Imitation jewelry
19	3399E	Sporting and athletic goods manufacturing	8947	Sports goods
		Machinery and Transport Equipment		
20	3339N	Scale and balance (except laboratory)	7453	Weighing machinery (excluding sensitive<5cg); parts
21	3342A	Telephone apparatus manufacturing radio & television broadcasting and wireless	7641	Electrical apparatus for line telephony or telegraph
22	3344A	Electron tube manufacturing	7761	Television picture tubes, cathode ray
23	3344C	Semiconductor and related device manufacturing	7763	Diodes, transistors & similar semiconductor devices
24	3345A	Electro medical & electrotherapeutic apparatus manufacturing	7741	Electro-diagnostic apparatus (excluding radiological)
25	3352D	Household refrigerator and home freezer manufacturing	7752	Household type refrigerators and food freezers
26	3352E	Household laundry equipment	7751	Household type laundry equipment
27	3361A	Automobile manufacturing	7812	Motor vehicles for the transport of persons
28	3361B	Light truck and utility vehicle manufacturing	7821	Motor vehicles for the transport of goods
29	3361C	Heavy duty truck manufacturing	7832	Road tractors for semi-trailers
30	3362B	Truck trailer manufacturing	7862	Trailer and semi-trailer for transport of goods
31	3362D	Travel trailer and camper manufacturing	7861	Trailers & semi-trailers for camping or housing

Table 2. Variables Measuring Industry Characteristics and their Expected Relationship with Intra-Industry Trade.

Hypothesis	Variables	Definitions	Expected Relationship With IIT
Product Differentiation	**ADVERT**	The advertisement expenses per dollar of shipment.	Positive
	VALADD	The value added per dollar of shipment.	Positive
	CMLA	The labor compensation per dollar of value added.	Negative
Economies of Scale	**S20**	S20 = 1 if the average production cost per unit of the top 20% of all firms in the industry is less than the industry average; else = 0.	Positive
Oligopolistic Behavior	**WEMS**	The world market share of U.S. exports in each industry.	Negative
Group Dummy Variables	**MG**	MG = 1if the industry is in the manufacturing group, else = 0.	Positive or Negative
	AG	AG = 1if the industry is in the agricultural group, else=0.	Positive or Negative

Table 3. Initial Model Regression Results.

Variable	Parameter Estimate	Standard Error	t-value	Pr > |t|	Variance Inflation
Dependent Variable: IITINDEX					
INTERCEPT	1.0645 **	0.2323	4.58	<.0001	0
ADVERT	2.8706	1.8119	1.58	0.1268	1.2870
VALADD	-0.0524	0.0485	-1.08	0.2913	1.1570
CMLA	-0.841 *	0.4079	-2.06	0.0507	1.4612
S20	-0.0889	0.1172	-0.76	0.4555	1.1759
WEMS	-0.8392	0.5111	-1.64	0.1142	1.1991
AG	-0.2142	0.1599	-1.34	0.1934	1.7669
MG	-0.0294	0.1343	0.22	0.8284	1.4905
F value		**1.65**		**Pr > F**	**0.172**
R-Square		**0.3341**		**Error DF**	**30**
Adjusted R-Square		**0.1314**			

* Significant at 10% level. ** Significant at 5% level.

Table 4. Final Model Regression Results.

Variable	Parameter Estimate	Standard Error	t-value	Pr > |t|	Variance Inflation
Dependent Variable: IITINDEX					
INTERCEPT	1.0268	0.1635	6.28	<.0001	0
ADVERT*MG	3.005 *	1.4692	2.05	0.0515	1.0858
VALADD*AG	-0.0802 *	0.0404	-1.98	0.0584	1.1499
CMLA	-0.7657 **	0.3305	-2.32	0.0290	1.1611
S20*AG	-0.6668 **	0.2707	-2.46	0.0210	1.0392
WEMS	-1.1048 **	0.4392	-2.52	0.0187	1.1137
F value		**3.69**		**Pr > F**	**0.0123**
R-Square		**0.4246**		**Error DF**	**30**
Adjusted R-Square		**0.3095**			

* Significant at 10% level. ** Significant at 5% level.